

This fact sheet answers the most frequently asked health questions (FAQs) about N,N-diethyl-*meta*-toluamide (DEET). For more information, call the CDC Information Center at 1-800-232-4636. This fact sheet is one in a series of summaries about hazardous substances and their health effects. It's important you understand this information because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

**HIGHLIGHTS:** Exposure to DEET occurs mainly by dermal contact from intentional application to the skin and clothing of consumer products containing DEET. Unintentional inhalation and oral exposure can also occur during normal use. The risk of health effects due to exposure to DEET following recommended application procedures appears to be quite low. DEET has been found in at least 2 of the 1,699 National Priorities List sites identified by the Environmental Protection Agency (EPA).

## What is DEET?

DEET is the chemical N,N-diethyl-*meta*-toluamide. The pure chemical is a white to amber-color liquid, with a faint aromatic odor. DEET is the active ingredient in some common repellents widely used to repel biting pests such as mosquitos and ticks.

DEET formulations can be added to sprays or mists, lotions and wipes. These products can be applied directly onto human skin or onto clothing. A significant benefit of DEET is better protection against illnesses transmitted by mosquitos or ticks such as West Nile Virus and Lyme disease.

## What happens to DEET when it enters the environment?

- DEET can enter the air during spray applications.
- In air, DEET can be broken down by reactions with other chemicals. One half of the amount of DEET in air will disappear in about 5 hours.
- DEET enters aquatic systems as a result of common human activities, such as showering or bathing and laundering of clothes after products containing DEET have been applied. Incomplete removal of DEET at waste water treatment facilities can contribute to DEET in aquatic systems.
- DEET in water can be degraded by aerobic microorganisms.
- DEET does not usually stay in the environment long.

## How might I be exposed to DEET?

- Exposure occurs by dermal contact from intentional application to human skin and clothing of consumer products containing DEET.
- Unintentional inhalation and oral exposure can also occur during normal use of DEET.

- Workers involved in the manufacture of DEET or of commercial products containing DEET can be exposed to higher levels of this substance.
- Exposure can occur by using water containing DEET for drinking or bathing or swimming in contaminated water. However, the levels of DEET detected in water and air are low.
- DEET has not been detected in soil.

## How can DEET affect my health?

There have been sporadic reports over the last several decades of an association between excessive use of repellents containing DEET and adverse effects. These effects included seizures, uncoordinated movements, agitation, aggressive behavior, low blood pressure, and skin irritation. However, given that DEET products are extensively used by consumers, the risk of health effects due to exposure to DEET appears to be quite low.

Studies of thousands of exposures to DEET-containing repellents reported to Poison Control Centers found that nearly 90% of the exposures did not produce symptoms that required treatment in a health care facility.

## How likely is DEET to cause cancer?

A study of workers in Sweden found that those who used insect repellents for 115 days or longer had an increased risk of developing testicular cancer. However, because of deficiencies in the study, the results were not conclusive.

Long-term studies in which dogs, rats, and mice were given DEET orally or in which liquid DEET was applied to the skin of mice and rabbits did not find an increase in tumors in the animals.

# N,N-Diethyl-*meta*-Toluamide (DEET)

**CAS # 134-62-3**

The U.S. Department of Health and Human Services (DHHS) has not classified DEET as to its carcinogenicity. The U.S. EPA's Office of Pesticide Programs has classified DEET as a Group D chemical, not classifiable as a human carcinogen. The International Agency for Research on Cancer has not classified DEET as to its carcinogenicity.

## How can DEET affect children?

Some children exposed to insect repellents or lotions containing DEET have experienced the same types of neurological effects observed in adults. In the specific case of seizures, it should be noted that because a relatively high percentage (23–29%) of children are exposed to DEET in North America and because seizure disorders occur in 3–5% of children, it would be expected to see an association just by chance.

## How can families reduce the risk of exposure to DEET?

To avoid overexposure to DEET and skin and eye irritation, the EPA requires that all DEET product labels include the following directions:

- Read and follow all directions and precautions on this product label.
  - Do not apply over cuts, wounds, or irritated skin.
  - Do not apply to hands or near eyes and mouth of young children.
  - Do not allow young children to apply this product.
  - Use just enough repellent to cover exposed skin and/or clothing.
  - Do not use under clothing.
  - Avoid over-application of this product.
  - After returning indoors, wash treated skin with soap and water.
- Wash treated clothing before wearing again.
  - Use of this product may cause skin reactions in rare cases.
  - Do not spray in enclosed areas.
  - To apply to face, spray on hands first and then rub on face.
  - Do not spray directly onto face.

See more information at:

<http://www2.epa.gov/insect-repellents/deet>

## Is there a medical test to show whether I've been exposed to DEET?

DEET and its breakdown products (metabolites) can be measured in blood and urine. However, the detection of DEET or its metabolites cannot predict the kind of health effects that might develop from that exposure. Because DEET and its metabolites leave the body fairly rapidly, the tests need to be conducted within hours after exposure.

## Has the federal government made recommendations to protect human health?

In order to protect against vector-borne illnesses such as West Nile Virus and Lyme Disease, the Centers for Disease Control and Prevention (CDC) recommends the use of DEET-containing products (at concentrations of at least 20% DEET) to repel biting pests such as mosquitoes and ticks for several hours.

## References

This ToxFAQs™ information is taken from the 2015 Toxicological Profile for DEET (N,N-Diethyl-*meta*-Toluamide) (Draft for Public Comment) produced by ATSDR DHHS, Atlanta, GA.

## Where can I get more information?

For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology and Human Health Sciences, 1600 Clifton Road NE, Mailstop F-57, Atlanta, GA 30333-4027.

Phone: 1-800-232-4636.

ToxFAQs™ on the web: [www.atsdr.cdc.gov/toxFAQs](http://www.atsdr.cdc.gov/toxFAQs)

ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.